Reg. No. :

Question Paper Code : X67618

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Seventh Semester
Mechanical Engineering
ME1004 – NUCLEAR ENGINEERING
(Regulations 2008)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. What is plum pudding ?
2. How is mass loss calculated ?
3. How much power is generated by the fissioning of 1g of U^{235} per day ?
4. List the different types of nuclear reactor designs.
5. What do you mean by closed nuclear fuel cycle ?
6. What is the composition of nuclear spent fuel ?
7. What is the function of a moderator ?
8. State the goals of generation IV reactors.
9. What is the need of pressure suppression system in reactor ?
10. List the primary objectives of reactor instrumentation safety system in nuclear power plants.

PART – B **(5×16=80 Marks)**

11. a) i) Discuss the advantages and disadvantages of nuclear power. **(6)**

ii) Enumerate the procedure for measuring the half life. **(10)**

(OR)

b) i) What is binding energy ? How it is measured ? **(8)**

ii) Calculate the binding energy of a neutron in $_3Li^7$ nucleus. Given the following isotopic masses
$_3Li^7$ = 7.016004 amu
$_3Li^6$ = 6.015125 amu
$_0n^1$ = 1.008665 amu. Express the result in Mev. **(8)**

12. a) Describe atomic mobile reactors and explain the function of submarine thermal atomic reactors, submarine atomic intermediate reactors with sketch. **(16)**

(OR)

b) Explain the following irradiation effects of thorium

i) With metal and its alloys **(8)**

ii) With mixed ceramic compounds. **(8)**

13. a) Describe the various stages of reprocessing of irradiated fuel.

(OR)

b) i) With a neat sketch, explain the working of solvent extraction equipment. **(10)**

ii) Write the characteristics of the spent fuel. **(6)**

14. a) Explain the construction and working principle of the Liquid-Metal fast breeder reactor with a neat sketch. **(16)**

(OR)

b) Explain the principle of operation of fusion reactors in detail. **(16)**

15. a) Explain the criteria for nuclear safety system. **(16)**

(OR)

b) Explain with a neat diagram the disposal of low level solid nuclear wastes. **(16)**

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